

Notice of Allowability

Application N .

10/615,571

Examiner

Andrew Schechter

Applicant(s)

DATE ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the filing of 19 February 2004.
2. ☒ The allowed claim(s) is/are 13,28,29,44,51,58-60,69-71,78,79,82,85-88,95,96,101,102,107,108,113,114,121,122,125,128-131,138,139,144,145,150,151,156,157,162 and 163.
3. ☒ The drawings filed on 8 July 2003 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/361,856.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 7/8/03
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Guy R. Gosnell, Reg. No. 34,610, on 8 June 2004.

The application has been amended as follows:

In the Claims:

In claim 129, "as claimed in Claim 54" has been replaced with --as claimed in Claim 59--.

Claims 156 and 157 have been amended as follows:

156. (Twice amended) The display apparatus as claimed in Claim 121, wherein said reflection film comprises one selected from: a dielectric multi-layered film; and a film lower in refractive index than said light guide.

157. (Twice amended) The display apparatus as claimed in Claim 129, wherein said reflection film comprises one selected from: a dielectric multi-layered film; and a film lower in refractive index than said light guide.

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In the Title:

The title has been changed to "Optical device and display apparatus using light diffraction and light guide".

In the Abstract:

The abstract has been replaced with the following:

An optical device and a display apparatus of the present invention are constructed so as to improve display characteristics of output light intensity, display contrast, and reduction of scattered light due to external light, and also to provide a large-screen. The optical device has a first stacked body and a plurality of second stacked bodies. The first stacked body includes a light guide, a first electrode, and an optical control layer. The second stacked body includes a plurality of second electrodes, the reflection film and a substrate. At least one of said first electrode and said second electrode has a periodic structure for inducing a fine periodic structure for light diffraction in said optical control layer.

In the Specification:

On page 1, lines 1-2, "U.S. Patent Application No. 09/361,856 filed July 27, 1999" has been replaced with --U.S. Patent Application No. 09/361,856 filed July 27, 1999, now U.S. Patent No. 6,618,104--.

End of Examiner's Amendment.

Allowable Subject Matter

2. Claims 13, 28, 29, 44, 51, 58-60, 69-71, 78, 79, 82, 85-88, 95, 96, 101, 102, 107, 108, 113, 114, 121, 122, 125, 128-131, 138, 139, 144, 145, 150, 151, 156, 157, 162, and 163 are allowed.

3. The following is an examiner's statement of reasons for allowance:

The prior art does not disclose the device of claim 13, in particular the limitations that there is a light transmissive plate-shaped light guide for guiding light incident from an end surface, with an optical control layer provided on its lower surface, wherein an electrode with a periodic structure induces a fine periodic structure for light diffraction in the optical control layer. Claim 13 is therefore allowed, as are its dependent claims 44, 51, 58, 69, 78, 79, 82, 85, 95, 101, 107, and 113.

The prior art does not disclose the device of claim 28, in particular the limitations that there is a light transmissive plate-shaped light guide for guiding light incident from an end surface, with an optical control layer provided on its lower surface, and periodic electrodes having periodic structures disposed in alternation induce a fine periodic structure for light diffraction in the optical control layer. Claim 28 is therefore allowed, as are its dependent claims 29, 86-88, 96, 102, 108, and 114.

The prior art does not disclose the device of claim 59, in particular the limitations that there is a light transmissive plate-shaped light guide for guiding incident light, with an optical control layer provided on its lower surface, and an electrode having periodic electrodes with a periodic structure for inducing a fine periodic structure for light

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diffraction in the optical control layer. Claim 59 is therefore allowed, as are its dependent claims 60, 70, 71, 121, 122, 125, 128-131, 138, 139, 144, 145, 150, 151, 156, 157, 162, and 163.

The closest prior art is discussed below.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 5,581,380 to *Bergman* discloses an optical device with a plate-shaped light guide for guiding light incident from an end surface, with an optical control layer on its lower surface, and first and second electrodes which apply an electric field to the optical control layer to make it change in refractive index or absorptivity or scattering degree, but does not disclose that an electrode has a periodic structure for inducing a fine periodic structure for light diffraction in the optical control layer.

U.S. Patent No. 6,091,463 to *Robinson et al.* discloses an optical device with an optical control layer, where first and second electrodes apply an electric field to the optical control layer to induce a fine periodic structure for light diffraction in the optical control layer, but it does not disclose a plate-shaped light guide as recited by the claims.

While such light guides are well-known (see subclass 349/63) for providing light to a (reflective-type) direct-view LCD, there is no teaching in the prior art to use such a light guide with a diffractive spatial light modulator as disclosed by *Robinson*, which is used as part of a projection LCD system.

U.S. Patent No. 5,434,690 to *Hisatake et al.* and Japanese Patent Document Nos. 01-033520 and 02-101424 (made of record by the applicant) similarly disclose optical systems using light diffraction, but not with a light guide. Japanese Patent Document No. 10-78569 (made of record by the applicant) discloses a reflective diffractive grating, but not with a light guide. In each case, there is no teaching in the art to modify the diffractive projection system or beam-splitter by adding the recited light guide, which is instead typically used with reflective-type direct-view LCD displays.

U.S. Patent No. 5,731,853 to *Taketomi et al.* discloses a display device using light diffraction [see abstract], which either uses a light guide as recited or is at least appropriate for such a light guide [see Fig. 8B]. However, the electrodes in this device do not have a periodic structure which induces a fine periodic structure for light diffraction in the optical control layer. Instead, the diffraction pattern is caused by a periodical construction of liquid crystals and polymers, and turned on or off by the electrodes for each pixel [see abstract].

U.S. Patent No. 6,618,104 to *Date et al.* is the patent resulting from this application's parent case.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AS

Andrew Schechter
8 June 2004



ROBERT H. KIM
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